



Chemical Resistance of Rigid Geon® Vinyls Based on Immersion Test

One of the most important properties of PVC material is its exceptional inertness. Rigid Geon® vinyl compounds are part of this group and they offer excellent resistance to a broad range of reagents and mixtures that are corrosive to many other materials. Their resistance to oxidation and moisture make rigid Geon® vinyls useful in outdoor applications and even in the Chemical Processing Industry.

Three generalizations concerning the environmental stability of rigid PVC can be drawn from these immersion tests. First of all, PVC is generally inert to most mineral acids, bases, salts and paraffinic hydrocarbon solutions. Secondly, PVC is *not* recommended for use with chlorinated or aromatic hydrocarbons, esters or ketones. Finally, the resistance of PVC to certain other fluid mixtures such as fuel oils with moderate aromatic content cannot be determined on the basis of immersion testing alone. For this class of materials, actual use data must be obtained.

It should be noted that in addition to temperature and reagent concentration, other factors such as stress level and product quality can also affect the chemical resistance of a plastic material in product form. Because of this, the final determination of suitability must often depend on some in-service testing which should be done with appropriate care and safety precautions.

This report covers the chemical resistance of normal impact (Type I) and impact modified (Type II) rigid Geon® vinyls. Table 1 tabulates specific immersion data obtained in our Product Application Laboratory for Geon® 8700A, 8750 and 8761 vinyls and the effects of various chemical reagents on their tensile strength. Table 2 indicates the suitability of rigid Geon® vinyls for use with more than 500 reagents. Table 2 is based on test data, experience and information from various sources. Final determination of the suitability of a material is the responsibility of the user because use conditions and required service life can be significant factors in the final decision.

Table 3 gives an indication of the variety of chemicals and mixtures that appear in commercially available paint removers, solvents, drain cleaners, spot removers, etc., that are used by the public. This investigation was done to see what effect these products might have on ASTM D 2665 1½in. Sch. 40 PVC pipe, traps and solvent cement joints under stress. Each assembly consisted of a short inlet pipe, a trap with three solvent cement joints plus an 18 in. long outlet pipe. The assemblies were held in place by clamping the inlet pipe in a vertical position with the trap and outlet pipe cantilevered from it.

To simulate use conditions, each trap was filled with water and then the chemical was poured in until it flowed from the outlet. This exposure continued for 48 hours and then the traps were flushed with water.

The 48-hour exposure of PVC sink traps to various chemicals and drain cleaners caused no failures and no leakage occurred. Some of the traps were softened and attacked slightly by some paint removers and solvents but they regained hardness after the traps were emptied and refilled with water. None of the other chemicals had any effect on the PVC trap assemblies.

These tests show that PVC sink traps are resistant to drain cleaners, detergents plus many of the commonly used solvents and that these products will not cause stress crack failure of PVC. Even the active solvents used in paint removers and metal cleaners only resulted in softening after extended contact and did not cause cracking or leakage.

Note that Plumbing Codes prohibit the dumping of many of these solvents into DWV systems and this is not to be taken as an endorsement of that procedure. Also be aware that the tubular traps made under ASTM F409 would not be equally resistant to this kind of abuse because they have less mass, use mechanical joints and may be made of other plastic materials that have less resistance to chemicals.

Table 1
Geon® 8700A Vinyl
Type II, Grade 1
Cell Class 16334

Chemical Reagent	30 Day Immersions				
	Room Temperature		Original Tensile (psi)	60°C	
	Tensile Strength (psi)	Weight Change (%)		Tensile Strength (psi)	Weight Change (%)
Acetic Acid (20%)	5600	+0.44	6000	4600	+5.44**
Acetic Acid (80%)	5600	+0.77	6000	2600	+11.76**
Acetic Acid (Glacial)	1900	+12.35**	6000	1700	+10.23**
Acetyl Nitrile	600	+26.49**	5900	500	+23.25**
Ammonium Bisulfate (70%)	--	--	--	--	--
Butane	4700	+0.63	5600	--	--
Calcium Hypochlorite	6100	+0.33	6400	--	--
Chlorine Gas (Dry)	2400	+36.61**	5800	--	--
Chlorine Gas (Wet)	1700	+36.02**	5800	--	--
Chromic Acid (10%)	6600	+0.34	6400	6500	+0.55
Chromic/Nitric (15/35)	3600	+2.46*	6300	1900	+34.43**
Crude Oil (Pennsylvania)	5700	+0.25	--	6100	+0.57
(Kansas)	5700	+0.25	--	5900	+0.66
(Sour)	6500	+0.04	--	6600	+0.16
Ferric Acetate	5500	+0.46	5700	4900	+2.91*
Fluoboric	7000	+0.36	7000	7400	+0.64
Freons- 21	900	+64.57**	5900	--	--
22	3600	+16.92**	5900	--	--
113	6000	+0.15	5900	--	--
114	5800	+0.42	5900	--	--
Carene 500	4000	+4.59**	5900	--	--
Gulf Oil (#10 Pride)	--	-0.05	--	--	-0.05
Hydrazine (97% Anhydrous)	4400	+7.64**	6300	--	--
Hydrochloric Acid (30%)	6100	+0.29	6000	6500	+1.75*
Hydrochloric Acid (Conc.)	5800	+0.80	6000	6700	+3.35*
Hydrofluoric Acid (70%k)	5400	+6.59**	5900	6200	+6.49**
Hydrogen Peroxide (30%)	--	--	5800	3800	-3.12*
Hydrogen Peroxide (50%)	4700	+0.53	5800	3600	-3.59*
Lead Nitrate	5400	+0.40	5700	5500	+0.96
Lux Liquid	--	+0.47	--	--	+1.72*
Manganese Chloride	5500	+0.32	5700	5600	+0.51
Mercuric Sulfate	5300	+0.44	5700	5300	+1.85*
Natural Gas	5500	+0.04	5600	--	--
Nitric Acid (30%)	6000	+0.36	6000	5600	+2.43*
Nitric Acid (Conc.)	4200	+12.44**	6000	2800	+18.03**
Peracetic Acid (40%)	2460	+5.4**	5770	2900	+7.8**
Potassium Bisulfate	5400	+0.38	5700	5700	+0.75
Potassium Amyl Xanthate	4600	+1.43	6100	4300	+5.27**
Potassium Ethyl Xanthate	4400	+2.05*	6100	5200	+1.66*
Propane	5600	+0.06	5600	--	--
Pyrogalllic Acid	5400	+0.44	5700	5400	+1.49
Salicylic Acid	5500	+0.50	5700	5400	+1.94*
Sodium Bichromate	5400	+0.46	5700	5500	+1.32
Sodium Hydroxide (50%)	--	+0.34	--	--	+0.92
Sodium Perchlorate	5500	+0.29	5700	5800	+0.38
Succinic Acid	5300	+0.51	5700	5700	+0.99
69% 68%	--	--	--	--	--
Sulfuric/Nitric (50/50)	--	--	--	--	--
Sulfuric Acid - (60%)	5800	-0.04	6000	6200	+0.05
(70%)	6000	-0.28	6000	6100	+0.82
(80%)	6000	-0.12	6000	6000	+5.38**
(85%)	5900	+0.52	6000	5900	+14.53**
(90%)	5100	+8.62**	6000	5400	+23.32**
(95%)	5000	+23.47**	6000	5400	+30.11**
(96.5%)	--	--	--	--	--
Transformer Oil (Bank 62)	6000	+0.02	--	6200	+0.56
Transformer Oil (Bank 110)	6000	+0.03	--	6100	+0.91
Trimethylamine	4400	+1.85*	5700	3700	+20.57**
Water (Distilled)	--	--	--	--	--

Table 1
 Geon® 8750 Vinyl
 Type I, Grade 2
 Cell Class 12464

Chemical Reagent	30 Day Immersions				
	Room Temperature		Original Tensile (psi)	60°C	
	Tensile Strength (psi)	Weight Change (%)		Tensile Strength (psi)	Weight Change (%)
Acetic Acid (20%)	7900	+0.22	7700	8500	+0.71
Acetic Acid (80%)	7700	+0.8	7700	7600	+1.62*
Acetic Acid (Glacial)	7400	+1.14	7700	2900	+12.83**
Acetyl Nitrile	800	+27.82**	7200	550	+29.43**
Ammonium Bisulfate (70%)	8000	0.00	--	8300	+0.06
Butane	7500	+0.07	7700	--	--
Calcium Hypochlorite	8000	+0.21	7900	--	--
Chlorine Gas (Dry)	2000	+31.07**	7500	--	--
Chlorine Gas (Wet)	1500	+32.79**	7500	--	--
Chromic Acid (10%)	7600	+0.20	7800	8700	+0.22
Chromic/Nitric (15/35)	8200	+0.11	8200	8200	+1.06
Crude Oil (Pennsylvania)	8000	+0.17	--	8900	0.00
(Kansas)	--	--	--	--	--
(Sour)	7300	+0.09	--	8200	+0.03
Ferric Acetate	7600	+0.26	7400	8600	+1.02
Fluoboric	8000	+0.23	8100	8200	+0.62
Freons- 21	1300	+61.21**	7700	--	--
22	3500	+13.32**	7700	--	--
113	7800	+0.09	7700	--	--
114	7900	+0.25	7700	--	--
Carene 500	7600	+0.45	7700	--	--
Gulf Oil (#10 Pride)	--	+0.01	--	--	+0.37
Hydrazine (97% Anhydrous)	6200	+4.19**	7300	--	--
Hydrochloric Acid (30%)	7800	+0.20	7700	8000	+1.26
Hydrochloric Acid (Conc.)	7800	+0.40	7700	7200	+2.15*
Hydrofluoric Acid (70%k)	5200	+3.90*	7200	5300	+5.24**
Hydrogen Peroxide (30%)	--	--	--	--	--
Hydrogen Peroxide (50%)	6900	+0.11	7000	7400	+0.38
Lead Nitrate	7300	+0.23	7400	8100	+0.63
Lux Liquid	--	+0.36	--	--	+1.42
Manganese Chloride	7400	+0.24	7400	8100	+0.36
Mercuric Sulfate	7500	+0.28	7400	8000	+0.71
Natural Gas	7600	+0.04	7700	--	--
Nitric Acid (30%)	7500	+0.13	7700	8400	+0.89
Nitric Acid (Conc.)	7500	+0.41	7700	7900	+2.83*
Peracetic Acid (40%)	7140	+0.70	7620	4880	+6.5**
Potassium Bisulfate	7700	+0.24	7400	8500	+0.53
Potassium Amyl Xanthate	7500	+0.30	7900	7700	+2.81*
Potassium Ethyl Xanthate	7200	+0.77	7900	7500	+1.54*
Propane	7200	-0.05	7700	--	--
Pyrogalllic Acid	7200	+0.25	7400	8100	+0.74
Salicylic Acid	7500	+0.32	7400	8500	+0.81
Sodium Bichromate	7500	+0.27	7400	8200	+0.73
Sodium Hydroxide (50%)	8024	+0.04	7458	8738	-0.02
Sodium Perchlorate	7300	+0.26	7400	8200	+0.33
Succinic Acid	7600	+0.27	7400	8300	+0.61
69% 68%					
Sulfuric/Nitric (50/50)	6500	+2.73*	7700	3300	+8.68**
Sulfuric Acid - (60%)	7400	-0.08	7700	8600	-0.23
(70%)	7700	-0.28	7700	8800	-0.27
(80%)	7700	-0.21	7700	8100	+1.19
(85%)	7600	+0.12	7700	5700	+13.14**
(90%)	7400	+1.14	7700	5300	+18.02**
(95%)	5400	+8.46**	7700	4800	+25.76**
(96.5%)	4400	+21.29**	--	4700	+ 38.37**
Transformer Oil (Bank 62)	7600	-0.02	--	8500	-0.06
Transformer Oil (Bank 110)	7600	-0.01	--	8300	-0.05
Trimethylamine	7300	-0.02	7400	7900	+3.40*
Water (Distilled)	7695	+0.27	7458	9048	+0.79

Table 1
 Geon® 8761 Vinyl
 Type I, Grade 1
 Cell Class 12454-B

Chemical Reagent	30 Days at Room Temperature		Original Tensile (psi)	30 Days at 60°C	
	Tensile Strength (psi)	Weight Change (%)		Tensile Strength (psi)	Weight Change (%)
Nitric Acid (30%)	7700	+0.25	7000	8300	+0.49
Nitric Acid (60%)	7500	+0.18	7000	7700	+2.31*
Nitric Acid (Conc.)	7500	+0.41	7000	7900	+2.83*
Acetic Acid (20%)	7900	+0.22	7000	8500	+0.71
Acetic Acid (80%)	7700	+0.08	7000	7600	+1.62*
Glacial Acetic Acid	7400	+1.14	7000	2900	+12.83**
Hydrochloric Acid (30%)	7600	+0.17	7000	7900	+0.97
Hydrochloric Acid (Conc.)	7600	+0.03	7000	7000	+1.55*
Sulfuric Acid (80%)	7500	+0.03	7000	8600	+0.05
Sulfuric Acid (85%o)	7800	+0.08	7000	8800	-0.02
Sulfuric Acid (90%)	7700	-0.02	7000	8300	+1.25
Sulfuric Acid (95%)	7700	-0.03	7000	6600	+7.62**

Table 2
Chemical Resistance of Rigid Geon® Vinyl

Reagent	Temperature		Reagent	Temperature	
	72°F	140°F		72°F	140°F
	-A-		Amyl Alcohol, Type I	R	NR
Acetaldehyde	NR	NR	Type II	NR	NR
Acetic Acid, pure	NR	NR	Amyl Chloride	NR	NR
Acetic Acid, 10%	R	R	Aniline	NR	NR
Acetic Acid, 20%, Type I	R	R	Aniline Chlorohydrate	NR	NR
Type II	R	NR	Aniline Hydrochloride	NR	NR
Acetic Acid, 80%, Type I Grade 1	R	R	Anthraquinone, Type II	R	NR
Type I Grade 2	R	NR	Anthraquinonesulfonic Acid	R	R
Type II	R	NR	Antimony Trichloride	R	R
Acetic Acid, Glacial, Type I	R	NR	Aqua Regia	NR	NR
Type II	NR	NR	Aromatic Hydrocarbons	NR	NR
Acetic Anhydride	NR	NR	Arsenic Acid, 80%	R	R
Acetone	NR	NR	Arsenic Trioxide (Powder)	R	
Acetyl Nitrile	NR	NR	Arylsulfonic Acid, Type I	R	R
Acetylene	R	R	Type II	R	NR
Acrylic Acid Ethyl Ester	NR	NR			
Adipic Acid	R	R			
Alcohols Methyl	R	R	Barium Nitrate	R	
Butyl	R	NR	Barium Carbonate	R	R
Propyl	R	R	Barium Chloride	R	R
Allyl Alcohol, 96%, Type I	R	NR	Barium Hydroxide (10%)	R	R
Type II	NR	NR	Barium Sulfate	R	R
Allyl Chloride	NR	NR	Barium Sulfide	R	R
Alum	R	R	Beer	R	R
Alum, Chrome	R	R	Beet Sugar Liquors	R	R
Alum, Potassium	R	R	Benzaldehyde, 10%, Type I	R	NR
Aluminum Alum	R	R	Type II	NR	NR
Aluminum Chloride	R	R	Benzaldehyde, above 10%	NR	NR
Aluminum Fluoride	R	R	Benzalkonium Chloride	R	
Aluminum Hydroxide	R	R	Benzene	NR	NR
Aluminum Oxychloride	R	R	Benzoic Acid	R	R
Aluminum Nitrate	R	R	Bismuth Carbonate	R	R
Aluminum Sulfate	R	R	Black Liquor	R	R
Ammonia (Gas-dry)	R	R	Bleach (12% Cl)	R	R
Ammonia (Liquid)	NR	NR	Borax	R	R
Ammonium Acetate	R	R	Boric Acid	R	R
Ammonium Alum	R	R	Breeder Pellets (Fish deriv.)	R	R
Ammonium Bifluoride	R	R	Brine (Acid)	R	
Ammonium Bisulfate, Type I	R	R	Bromic Acid	R	R
Ammonium Carbonate	R	R	Bromine, Liquid	NR	NR
Ammonium Chloride	R	R	Bromine, Vapor (25%)	R	R
Ammonium Dichromate	R		Bromine Water, Type I	R	R
Ammonium Fluoride, 25%, Type I	R	NR	Type II	NR	NR
Type II	NR	NR	Bromobenzene	NR	NR
Ammonium Hydroxide	R	R	Bromotoluene	NR	NR
Ammonium Hydroxide, 10%	R	R	Butadiene, Type I	R	R
Ammonium Hydroxide, 28%	R	R	Type II	NR	NR
Ammonium Metaphosphate	R	R	Butane, Type I	R	R
Ammonium Nitrate	R	R	Type II	NR	NR
Ammonium Persulfate	R	R	Butanol, Primary, Type I	R	R
Ammonium Phosphate	R	R	Type II	NR	NR
Ammonium Sulfate	R	R	Butanol, Secondary, Type I	R	NR
Ammonium Sulfide	R	R	Type II	NR	NR
Ammonium Thiocyanate	R	R	Butyl Acetate, Type I	R	NR
Amyl Acetate	NR	NR	Type II	NR	NR

Reagent	Temperature		Reagent	Temperature	
	72°F	140°F		72°F	140°F
Butyl Alcohol, Type I	R	R	Chrome Alum	R	R
Type II	R	NR	Chromic Acid, 10%	R	R
Butyl Cellosolve	R		Chromic Acid, 50%	NR	NR
Butyl Mercaptan, Type II	NR	NR	Chromic/Nitric Acid, Type I	R	R
Butyl Phenol	R	NR	15%-35% Type II	NR	NR
Butyl Stearate	R		Chromic/Sulfuric/Water,		
Butynediol, Type I	R	NR	50/15/35 Type I	R	NR
Type II	NR	NR	Citric Acid	R	R
Butyric Acid, Type I	R	NR	Coconut Oil Alcohol, Type I	R	R
Type II	NR	NR	Copper Carbonate	R	R
			Copper Chloride	R	R
	-C-		Copper Cyanide	R	R
Cadmium Cyanide	R	R	Copper Fluoride	R	R
Caffeine Citrate (Sat.)	R		Copper Nitrate	R	R
Calcium Bisulfide	R	R	Copper Sulfate	R	R
Calcium Bisulfite	R	R	Corn Syrup	R	R
Calcium Bisulfite Bleach Liquor	R		Cottonseed Oil	R	R
Calcium Carbonate	R	R	Cresol, Type I	NR	NR
Calcium Chlorate	R	R	Type II	NR	NR
Calcium Chloride	R	R	Cresylic Acid, 50%, Type I	R	R
Calcium Hydroxide	R	R	Type II	R	NR
Copper Hypochlorite	R	R	Crotonaldehyde	NR	NR
Calcium Nitrate	R	R	Crude Oil, Type I	R	R
Calcium Oxide, Type I	R	R	Type II	R	NR
Calcium Sulfate	R	R	Cupric Fluoride	R	R
Camphor (Crystals)	R		Cupric Sulfate	R	R
Cane Sugar Liquors	R	R	Cuprous Chloride	R	R
Carbitol	R		Cyclanones, Type I	R	R
Carbon Dioxide	R	R	Cyclohexane	NR	NR
Carbon Dioxide-Aqueous Solution	R	R	Cyclohexanol	NR	NR
Carbon Disulfide	NR	NR	Cyclohexanone	NR	NR
Carbon Monoxide	R	R			
Carbon Tetrachloride, Type I	R	NR		-D-	
Type II	NR	NR	D.D.T. (Xylene Base)	NR	NR
Carbonic Acid	R	R	Desocyphephedrine Hydrochloride	R	
Castor Oil	R	R	Detergents	R	R
Caustic Potash	R	R	Dextrin	R	R
Cellosolve	R	NR	Dextrose	R	R
Cellosolve Acetate	R		Diacetone Alcohol	R	
Chloroacetic Acid, Type I	R	R	Diazo Salts	R	R
Type II	R	NR	Dibutoxy Ethyl Phthalate	NR	NR
Chloral Hydrate	R	R	Dibutyl Phthalate	NR	NR
Chloramine	R		Dibutyl Sebocate	R	NR
Chloric Acid, 20%	R	R	Dichlorobenzene	NR	NR
Chloride (Water)	R	R	Diesel Fuels	R	
Chlorinated Solvents	NR		Diethyl Ether	R	
Chlorine (Dry-liquid)	NR	NR	Diglycolic Acid	R	R
Chlorine (Liquid) (under pressure)	NR		Dimethyl Hydrazine	NR	NR
Chlorine Gas (Dry)	NR		Dimethylamine, Type I	R	R
Chlorine Gas (Wet)	NR	NR	Type II	NR	NR
Chlorine Water	R	NR	Diocetylphthalate	NR	NR
Chloroacetic Acid	R	R	1,4 - Dioxane	NR	NR
Chloroacetyl Chloride	R	NR	Disodium Phosphate	R	R
Chlorobenzene	NR		Distilled Water	R	R
Chloroform	NR	NR			
Chloropicrin	NR	NR		-E-	
Chlorosulfonic Acid	R		Epsom Salt	R	
Chlorox Bleach Solution	R	NR	Esters	NR	NR

Reagent	Temperature		Reagent	Temperature	
	72°F	140°F		72°F	140°F
Ethers	NR	NR	-H-		
Ethyl Acetate	NR	NR	Heptane, Type I	R	R
Ethyl Acrylate	NR	NR	Type II	R	NR
Ethyl Alcohol, Type I	R	R	Hercolyn	R	
Type II	R	NR	Hexane, Type I	R	NR
Ethyl Chloride	NR	NR	Type II	NR	NR
Ethyl Chloroacetate	NR	NR	Hexanol, Tertiary, Type I	R	R
Ethyl Ether	NR	NR	Type II	R	NR
Ethylene Bromide	NR	NR	Hydrobromic Acid, 20%	R	R
Ethylene Chlorohydrin	NR	NR	Hydrochloric Acid, 10%	R	R
Ethylene Dichloride	NR	NR	Hydrochloric Acid, 30%	R	R
Ethylene Glycol	R	R	Hydrochloric Acid, Type I Grade 1	R	R
Ethylene Oxide	NR	NR	Conc. Type I Grade 2	R	NR
			Type II	R	NR
	-F-		Hydrochloric Acid Pickling	R	R
Fatty Acids	R	R	Hydrocyanic Acid	R	R
Ferric Acetate	R	NR	Hydrofluoric Acid, 48%	R	NR
Ferric Chloride	R	R	Hydrofluoric Acid, 50%, Type I	R	NR
Ferric Hydroxide	R	R	Type II	NR	NR
Ferric Nitrate	R	R	Hydrofluoric Acid, 70%	NR	NR
Ferric Sulfate	R	R	Hydrofluorsilicic Acid	R	R
Ferrous Chloride	R	R	Hydrogen	R	R
Ferrous Hydroxide	R		Hydrogen Peroxide, 30%	R	R
Ferrous Nitrate	R		Hydrogen Peroxide, 50%	R	R
Ferrous Sulfate	R	R	Hydrogen Peroxide, 90%	R	R
Fish Solubles	R	R	Hydrogen Phosphide, Type I	R	R
Fluoroboric Acid	R	R	Type II	NR	NR
Fluorine Gas (Wet)	R	NR	Hydrogen Sulfide	R	R
Fluorine Gas, Type I	R	NR	Hydroquinone	R	R
Type II	NR	NR	Hydroxylamine Sulfate	R	R
Fluorosilicic Acid, 25%	R	R	Hypochlorine Acid	R	R
Formaldehyde, Type I	R	R	Hypochlorite	R	
Type II	NR	NR	Hypochlorous Acid	R	R
Formic Acid	R	NR	Hydrazine (Anhydrous) 97%	NR	NR
Fructose	R	R			
Fruit Juices and Pulp	R	R	-I-		
Furfural	NR	NR	Iodine	NR	NR
Freon II, Type I	R	R	Iodine Solution (10%)	NR	NR
Type II	NR	NR			
Freon 12	R	R	-K-		
Freon 21	NR	NR	Kerosene	R	R
Freon 22	NR	NR	Ketones	NR	NR
Freon 113	R		Kraft Liquors	R	R
Freon 114	R				
Carene 500, Type I	R		-L-		
Type II	NR		Lactic Acid, 25%	R	R
			Lactic Acid, 80%	R	
	-G-		Lard Oil	R	R
Gallic Acid	R	R	Lauric Acid	R	R
Gas (Coke Oven)	NR	NR	Lauryl Chloride, Type I	R	
Glucose	R	R	Type II	R	NR
Glycerine	R	R	Lead Acetate	R	R
Glycol	R	R	Lead Chloride	R	R
Glycolic Acid	R	R	Lead Nitrate	R	R
Grapesugar	R	R	Lead Sulfate	R	R
Green Liquor	R	R	Linoleic Acid	R	R

Reagent	Temperature		Reagent	Temperature	
	72°F	140°F		72°F	140°F
Linoleic Oil, Type I	R	R	Natural Gas	R	R
Type II	R	NR	Nickel Acetate	R	
Linseed Oil	R	R	Nickel Chloride	R	R
Liquors, Type I	R	R	Nickel Nitrate	R	R
Type II	NR	NR	Nickel Sulfate	R	R
Lithium Bromide	R	R	Nicotine	R	R
Lubricating Oil, ASTM #1	R	R	Nicotine Acid	R	R
ASTM #2	R	R	Nitric Acid 84% + Sulfuric		
ASTM #3, Type I	R	R	Acid 16%	R	
Type II	R	NR	Nitric Acid, Anhydrous	NR	NR
Lux Liquid	R	NR	Nitric Acid, 10%, Type I	R	R
			Type II	R	NR
			Nitric Acid, 30%, Type I	R	R
			Type II	R	NR
Machine Oil	R	R	Nitric Acid, 60%, Type I	R	R
Magnesium Carbonate	R	R	Type II	R	NR
Magnesium Chloride	R	R	Nitric Acid, 68%, Type I	R	NR
Magnesium Citrate, Type I	R	R	Type II	NR	NR
Magnesium Hydroxide	R	R	Nitrobenzene	NR	NR
Magnesium Nitrate	R	R	Nitroglycerine	NR	NR
Magnesium Sulfate	R	R	Nitrous Oxide	R	NR
Manganese Chloride	R	R	Nitroglycol	NR	NR
Manganese Sulfate (Sat.)	R	R			
Manganese Sulfate (10%)	R	R			
Manganese Sulfate (20%)	R	R			
Maleic Acid	R	R	Ocenol, Type I	R	R
Malic Acid	R	R	Oils and Fats	R	R
Manufactured Gas	R	R	Oils, Sour Crude	R	R
Mercural Ointment, Blue (5%)	R		Oleic Acid	R	R
Mercuric Chloride	R	R	Oleum	NR	NR
Mercuric Cyanide	R	R	Oxalic Acid	R	R
Mercurous Nitrate	R	R	Oxygen	R	R
Mercury	R	R	Ozone	R	R
Mercury Ointment (Ammoniated)	R				
Methylene Chlorobromide	NR	NR			
Methoxyethyl Oleate	R		Palmitic Acid, 10%	R	R
Methyl Alcohol	R	R	Palmitic Acid, 70%, Type I	R	NR
Methyl Cellosolve	NR	NR	Type II	NR	NR
Methyl Chloride	NR	NR	Paraffin, Type I	R	R
Methyl Ethyl Ketone	NR	NR	Peracetic Acid, 40%, Type I	R	NR
Methyl Iso-Butyl Ketone	NR	NR	Type II	NR	NR
Methyl Methacrylate	R		Perchloric Acid, 10%,	R	R
Methyl Salicylate	R		Perchloric Acid, 15%, Type I	R	NR
Methyl Sulfate	R	NR	Type II	NR	NR
Methyl Sulfuric Acid	R	R	Perchloric Acid, 70%, Type I	R	NR
Methylamine	NR	NR	Type II	NR	NR
Methylene Bromide	NR	NR	Perphosphate	R	
Methylene Chloride	NR	NR	Petroleum Liquifier	R	R
Methylene Iodine	NR	NR	Petroleum Oils (Sour)	R	NR
Milk	R	R	Phenol	NR	NR
Mineral Oils	R	R	Phenylhydrazine	NR	NR
Mixed Acids	R	R	Phenylhydrazine Hydrochloride	NR	NR
Molasses	R	R	Phosgene, Liquid	NR	NR
Muriatic Acid	R	R	Phosgene, Gas, Type I	R	
			Type II	R	R
			Phosphoric Acid, 10%	R	R
Naphtha, Type I	R	R	Phosphoric Acid, 25%	R	R
Type II	R	NR	Phosphoric Acid, 50%	R	R
Naphthalene	NR	NR	Phosphoric Acid, 75%	R	R

Reagent	Temperature		Reagent	Temperature	
	72°F	140°F		72°F	140°F
Phosphoric Acid, 85%	R	R	Plating Solutions (continued):		
Phosphorous (Yellow), Type I	R	NR	Tin	R	R
Type II	R	NR	Zinc	R	R
Phosphorous Pentoxide, Type I	R	NR	Pyridine, Type I	NR	NR
Type II	R	NR	Pyrogalllic Acid	R	NR
Phosphorous Trichloride	NR	NR	Propylene Oxide	NR	NR
Photographic Solutions:					
DK #3	R	R		-R-	
Dektal Developer	R	R	Rayon Coagulating Bath	R	R
Kodak Fixer	R	R	Refinery Crudes	R	R
Kodak Short Stop	R	R	Rochelle Salts, Type I	R	R
Picric Acid	NR	NR			
Potash (Sat. Aq.), Type I	R	R		-S-	
Potassium Alum	R	R	Salicylic Acid	R	R
Potassium Amyl Xanthate, Type I	R	NR	Santicizer	NR	
Type II	NR	NR	Sea Water	R	R
Potassium Bicarbonate	R	R	Selenic Acid	R	R
Potassium Bisulfate	R	R	Sewerage	R	R
Potassium Borate	R	R	Silicic Acid	R	R
Potassium Bromate	R	R	Silver Cyanide	R	R
Potassium Bromide	R	R	Silver Nitrate	R	R
Potassium Carbonate	R	R	Silver Plating Solution	R	R
Potassium Chromate	R	R	Silver Sulfate	R	R
Potassium Chlorate	R	R	Soaps	R	R
Potassium Chloride	R	R	Sodium Acetate	R	R
Potassium Cyanide	R	R	Sodium Alum	R	R
Potassium Dichromate	R	R	Sodium Benzoate	R	R
Potassium Ethyl Xanthate, Type I	R	NR	Sodium Bicarbonate	R	R
Type II	NR	NR	Sodium Bichromate	R	R
Potassium Ferricyanide	R	R	Sodium Bisulfate	R	R
Potassium Ferrocyanide	R	R	Sodium Bisulfite	R	R
Potassium Fluoride	R	R	Sodium Bromide	R	R
Potassium Hydroxide	R	R	Sodium Carbonate	R	R
Potassium Nitrate	R	R	Sodium Chlorate	R	NR
Potassium Perborate	R	R	Sodium Chloride	R	R
Potassium Perchlorate	R	R	Sodium Chlorite	NR	NR
Potassium Permanganate, 10%	R	R	Sodium Cyanide	R	R
Type I, 25%	R	NR	Sodium Dichromate	R	R
Type II	R	at 125°F	Sodium Ferricyanide	R	R
Potassium Persulfate	R	R	Sodium Ferrocyanide	R	R
Potassium Sulfate	R	R	Sodium Fluoride	R	R
Propane	R	R	Sodium Hydroxide, 10%	R	R
Propane Gas	R	R	Sodium Hydroxide, 30%	R	R
Propargyl Alcohol, Type I	R	R	Sodium Hydroxide, 50%	R	R
Type II	R	NR	Sodium Hypochlorite	R	
Propyl Alcohol, Type I	R	R	Sodium Nitrate	R	R
Type II	R	NR	Sodium Nitrite	R	R
Propylene Dichloride	NR	NR	Sodium Peroxide, 8750	R	R
Plating Solutions:			Sodium Perchlorate	R	R
Brass	R	R	Sodium Sulfate	R	R
Cadmium	R	R	Sodium Sulfide	R	R
Copper	R	R	Sodium Sulfite	R	R
Gold	R	R	Sodium Thiosulfate	R	R
Indium	R	R	Sour Crude Oil (West Texas)	R	R
Lead	R	R	Stannic Chloride	R	R
Nickel	R	R	Stannous Chloride	R	R
Rhodium	R	R	Starch	R	R
Silver	R	R	Stearic Acid	R	R

Reagent	Temperature		Reagent	Temperature	
	72°F	140°F		72°F	140°F
Stoddards Solvent	NR	NR	Toluol or Toluene	NR	NR
Succinic Acid	R	R	Transformer Oil	R	R
Sulfite Liquor	R	R	Tributyl Phosphate	NR	NR
Sulfur	R	R	Tributyl Citrate	R	
Sulfur Dioxide, (Dry)	R	R	Trichloroacetic Acid	R	
Sulfur Dioxide, (Wet), Type I	R	NR	Trichloroethylene	NR	NR
Type II	NR	NR	Triethanolamine	R	NR
Sulfur Trioxide	R	R	Trilones	NR	NR
Sulfuric Acid, 3%	R	R	Trimethyl Propane, Type I	R	R
Sulfuric Acid, 10%	R	R	Type II	R	NR
Sulfuric Acid, 20%	R	R	Trisodium Phosphate	R	R
Sulfuric Acid, 33%	R	R	Turpentine, Type I	R	R
Sulfuric Acid, 50%	R	R	Type II	NR	NR
Sulfuric Acid, 70%	R	R	Trimethylamine, Type I	R	NR
Sulfuric Acid, 80%, Type I	R	R	Type II	NR	NR
Type II	NR	NR			
Sulfuric Acid, 85%, Type I	R	R		-U-	
Type II	NR	NR	Urea		R
Sulfuric Acid, 90%			Urine		R
Type I Grade 1	R	NR			
Type I Grade 2	NR	NR		-V-	
Type II	NR	NR	Vaseline		NR
Sulfuric Acid, 95%			Vegetable Oil		R
Type I Grade I	R	NR	Vinegar		R
Type I Grade 2	NR	NR	Vinyl Acetate		NR
Type II	NR	NR			
Sulfuric Acid Pickling	R	R		-W-	
Sulfuric/Nitric (50/50)	NR	NR	Water Acid Mine		R
69% 68%			Water Deionized		R
Sulfurous Acid	R	R	Water Demineralized		R
			Water Distilled, Water Fresh		R
			Water Salt		R
	-T-		Whiskey		R
Tall Oil	R	R	White Liquor		R
Tannic Acid	R	R	Wines		R
Tanning Liquors	R	R			
Tartaric Acid	R	R			
Tetra Sodium Pyrophosphate	R	R		-X-	
Tetraethyl Lead, Type I	R		Xylene or Xylol		NR
Type II	R	NR			NR
Tetrahydrodurane	NR	NR		-Z-	
Thionyl Chloride	NR	NR	Zinc Chloride		R
Thread Cutting Oil	R		Zinc Nitrate		R
Tirpineol	R		Zinc Sulfate		R
Titanium Tetrachloride	R	NR			

R -Recommended
 NR-Not Recommended
 Blank spaces indicate lack of specific recommendations.

Table 3
Chemical Resistance Tests on Stressed PVC Sink Traps* Vinyl

Product	Test Results
Fireproof Energine	No effect.
Metal Klean - methylene, chloride, toluene, ammonia	Softening noted at 23 hrs.; deflection of outlet pipe noted at 48 hrs. No leakage.
Wash Away Paint Remover - methylene chloride, methanol	Softening noted at 23 hrs.; deflection of outlet pipe noted at 48 hrs. No leakage.
Dexall Wood Patch Thinner - toluene, acetone, isopropyl alcohol, hydrocarbons	Softening noted at 23 hrs.; deflection of outlet pipe noted at 48 hrs. No leakage.
Paint Reducer - toluene	No effect.
Lacquer Thinner - butanol	No effect.
Glid Strip	Softening noted at 23 hrs.; deflection of outlet pipe noted at 48 hrs. No leakage.
Strypeeze - methylene chloride, methanol, acetone	No effect.
Kwikeeze - methylene chloride, toluene, methanol, acetone	No effect.
Gum Out-xylene	No effect.
Trend - detergent	No effect.
Joy - detergent	No effect.
Drano - trichloroethane	No effect.
Sani-flush - sodium bisulfate monopotassium peroxysulfate	No effect.
Nu-Bol	No effect.
Swan - detergent	No effect.
Hercules Sizzle - hydrochloric acid	No effect.

Product	Test Results
Mechanics Carburetor Cleaner - chlorinated hydrocarbons	Slight softening noted at 48 hrs.; no deflection or leakage.
Cresote - coal tar product	No effect.
El Pico Wax Free - methanol	Softening noted at 23 hrs.; deflection of outlet pipe noted at 48 hrs. No leakage.
Magic Fireproof Spot Remover	No effect.
Ortho Orthorix Spray - ethylene dichloride	No effect.
Samsons Paint Remover - methanol acetone	Slight softening noted at 48 hrs.; no deflection or leakage.
Mule Kick Waste Pipe Cleaner	No effect.
Mule Kick Bowl Cleaner	No effect.
Cloroben P-T - orthodichlorobenzene	No effect.
S-T Drain Opener - sulfuric acid	No effect.
Drain Snake - sulfuric acid	No effect.
Calci Solve	No effect.
Plumbers Ideal	No effect.
McKay Parts Dip - chlorinated hydrocarbon	Slight softening noted at 48 hrs.; no deflection or leakage.
SW Exsolvent Paint Thinner	No effect.
Magic Cloud Bio - detergent ammonia	No effect.
Clobber - sulfuric acid	No effect.
Liquid Snake - sulfuric acid	No effect.
*Traps tested were made of Geon® 85297 which is a Type I Grade 1 compound specially developed by the Geon® Chemical Group for use in PVC fittings.	
Note: All PVC traps that softened regained hardness after flushing and refilling with water. All traps sustained a 15 foot head of water for 3 days without leakage. Seven of the traps showed some degree of interior exfoliation.	



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